

007728 P01 USA/DSM/IBSS/LAP
Application No: 10/825,831
Page 2 of 11

IN THE CLAIMS

Please substitute the following listing of claims for the previous listing of claims.

1. (Currently amended) A replaceable gas nozzle that is insertable in a gas distributor ring of a substrate processing chamber and that can be shielded within the chamber, the gas nozzle comprising:

a longitudinal ceramic body having a channel to direct the flow of the gas into the chamber, the ceramic body comprising a first external thread to mate with the gas distributor ring, a second external thread to receive a heat shield, the channel comprising an inlet to receive the gas from the gas distributor ring, and a pinhole outlet at the end of the channel to release the gas into the chamber, wherein the pinhole outlet has a diameter d_p , and wherein the distance d_{st} between the second external thread and the pinhole outlet is about $90d_0$ to about $140d_0$.

2. (Canceled)

3. (Currently amended) A nozzle according to claim 1 2 wherein d_0 is from about 0.3 mm to about 0.4 mm.

4. (Currently amended) A nozzle according to claim 1 2 wherein d_{st} is from about 30 mm to about 55 mm.

5. (Original) A nozzle according to claim 1 wherein the ceramic body is composed of aluminum oxide.

6. (Original) A nozzle according to claim 1 wherein the ceramic body is composed of aluminum nitride.

007728 P01 USA/DSM/IBSS/LAP
Application No: 10/825,831
Page 3 of 11

7. (Currently amended) A nozzle according to claim 1 wherein the ceramic body tapers at an angle from about 35° to about 45° to the pinhole outlet.

8. (Original) A nozzle according to claim 1 further comprising a heat shield mounted on the second external thread.

9. (Currently amended) A heat shield for shielding a nozzle extending into a chamber to introduce a process gas into the chamber through a nozzle outlet, wherein the chamber defines a processing region therein and has a substrate support to support a substrate for processing in the chamber, the heat shield comprising:

a hollow member configured to be coupled with the nozzle and having an internal dimension sufficiently large to be disposed around at least a portion of the nozzle, the hollow member having an extension which projects distally of the nozzle outlet and which includes a heat shield opening for the process gas to flow therethrough from the nozzle outlet, the extension of the heat shield is sized to project distally of the nozzle outlet by a distance of between about a radius of the nozzle and about a diameter of the nozzle.

10. (Currently amended) The heat shield of claim 9 wherein the hollow member is cylindrical and has an internal cross-section which is larger than an external cross-section of the nozzle by about an amount smaller than the thickness of the heat shield.

11. (Currently amended) The heat shield of claim 9 wherein the hollow member comprises a ceramic material.

12. (Canceled)

13. (Currently amended) A heat shield according to claim 11 wherein the ceramic material comprises aluminum oxide or aluminum nitride.

007728 P01 USA/DSM/IBSS/LAP
Application No: 10/826,831
Page 4 of 11

14. (Currently amended) A heat shield according to claim 9 6 wherein the extension projects distally by about 5 mm to about 8 mm.

15. (Currently amended) A shielded gas nozzle for a substrate processing chamber comprising:

(a) a longitudinal ceramic body having a channel to direct the flow of the gas into the chamber, the ceramic body comprising a first external thread to mate with the gas distributor ring, a second external thread to receive a heat shield, the channel comprising an inlet to receive the gas from the gas distributor ring, and a pinhole outlet at the end of the channel to release the gas into the chamber, the pinhole outlet has a diameter d_0 , and wherein the distance d_1 between the second external thread and the pinhole outlet is about $90d_0$ to about $140d_0$:[.]]

(b) a hollow member configured to be coupled with the ceramic body and having an internal dimension sufficiently large to be disposed around at least a portion of the ceramic body, the hollow member having an extension which projects distally of the pinhole outlet and which includes a heat shield opening for the process gas to flow therethrough from the pinhole outlet.

16. (Canceled)

17. (Currently amended) The shielded gas nozzle according to claim 15 ~~heat shield of claim 3~~ wherein the hollow member is cylindrical and has an internal cross-section which is larger than an external cross-section of the ceramic body by about an amount smaller than the thickness of the hollow member.

18. (Currently amended) The shielded gas nozzle according to claim 15 ~~heat shield of claim 3~~ wherein the extension of the hollow member is sized to project distally of the pinhole outlet by a distance of between about a radius of the ceramic body and about a diameter of the ceramic body.

007728 P01 USA/DSM/IBSS/LAP
Application No: 10/825,831
Page 5 of 11

19. (Currently amended) A shielded gas nozzle according to claim 15 +
wherein the ceramic body and hollow member are composed of aluminum oxide.

20. (Currently amended) A shielded gas nozzle according to claim 15 +
wherein the ceramic body and the hollow member are composed of aluminum nitride.